

REMARKS

The Office Action mailed July 15, 2004 has been reviewed and carefully considered. Claims 1-12 remain pending, the independent claims remaining 1, 2, 5 and 8. Reconsideration of the above-identified application in view of the following remarks is respectfully requested.

Claims 1-12 stand rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 6,278,536 to Kai et al. ("Kai") in view of U.S. Patent No. 5,633,741 to Giles.

Claim 1 recites, ". . . an interleaver; a de-interleaver; and a means for adding and dropping bi-directional signals; wherein the channels of said forward direction and said reverse direction are interleaved by said interleaver, said interleaved optical signals are added/dropped according to channels, and said added/dropped bi-directional signals are de-interleaved by said de-interleaver into a forward optical signal and a reverse optical signal. . ."

Kai makes no disclosure or suggestion of interleaving.

Giles relates to interleaving one signal against another signal that is propagating in the opposite direction.

The Office Action suggests it would have been obvious to modify Kai, in view of Giles, to replace the multiplexing coupler 20 and demultiplexing coupler 21 (

FIG. 1) with a Giles interleaver and deinterleaver, respectively (see Office Action, page 4, first full paragraph).

However, the Office Action fails to identify what it deems to be the Giles interleaver and what it deems to be the Giles deinterleaver.

Notably, the Office Action cites, as motivation for its proposed combination, "in order to provide greater spacing between the channels in either direction and thereby reduce negative effects of four wave mixing and facilitate filtering requirements at the receiving end (see Giles, column 6, lines 8-11; column 7, lines 29-42)."

Although Giles interleaving of the Kai channels would increase interchannel spacing when transmitting on one direction, Giles would likewise have suggested the elimination of the optical coupler 20. In particular, to ease optical filtering requirements (Giles, col. 5, line 8(9)), Giles would, if anything (col. 6, line 12(13): "impractical"), have suggested an additional ADM unit 105, so that forward and reverse signals could be easily filtered (Giles, col. 5, line 7(8): "increase spacing"; col. 20, line 23: "branch," i.e., filter) by their respective ADM units. With the multiplexing optical coupler 20 gone, there is apparently no need for the demultiplexing optical coupler 21. It is accordingly unclear what in Kai/Giles corresponds to:

an interleaver; a de-interleaver; and a means for adding and dropping bi-directional signals; wherein the channels of said forward direction and

said reverse direction are interleaved by said interleaver, said interleaved optical signals are added/dropped according to channels, and said added/dropped bi-directional signals are de-interleaved by said de-interleaver into a forward optical signal and a reverse optical signal

In addition, the Kai multiplexer multiplexes forward and reverse signals into a single signal traveling in a single direction; whereas, Giles interleaves one signal against another signal that is propagating in the opposite direction. Accordingly, the manner in which the Office Action is combining the two references, with an interleaver whose structure appears to come from nowhere else but our specification, is not suggested by the references themselves or by what was generally known to those of ordinary skill in the art.

For at least the foregoing reasons, it appears that the Examiner is using impermissible hindsight gained from reading the present invention disclosure to reach a particular end result.

Moreover, as set forth further above, an actual combining of the two references, if such would have been undertaken, would have resulted in an embodiment that does not resemble claim 1.

For at least the above reasons, the combination of references proposed by the Office Action fails to render obvious the present invention as recited in claim 1.

Reconsideration and withdrawal of the rejection is respectfully requested.

The other independent claims likewise recite interleaving, and are likewise deemed to be patentable over the references of record for at least the same reasons.

In addition, with respect to claims 2 and 8, they both recite, ". . . a first interleaver having a first node, a second node, and a third node for interleaving said forward optical signal received at the first node and said reverse optical signal received at the second node, and for outputting said interleaved forward and reverse optical signals through the third node. . ."

The Kai/Giles combination fails to feature this aspect of claim 2.

With respect to claim 5, it recites, ". . . de-interleaving the added/dropped optical signals. . ."

The Kai/Giles combination fails to feature this aspect of claim 5.

Each of the rejected claims depends from a base claim which has been shown to be patentable and is likewise patentable.

However, each dependent claim warrants additional consideration based on its further, individual merits.

Claims 13-16 stand rejected under 35 U.S.C. 103(a) as unpatentable over Kai in view of Giles and U.S. Patent No. 5,986,783 to Sharma et al. ("Sharma").

Claims 13-16 depend from base claims 1, 5 and 8, respectively. Sharma

relates to optical multiplexing, but not to interleaving. Sharma fails to compensate for the shortcomings of the other references applied in rejection of claims 13-16.

In addition each of claims 13-16 further distinguish over the applied references.

For example, claim 13 recites:

The ADM of claim 1, wherein said ADM resides at a WDM node in a said WDM network system, said WDM node being connected in said WDM network system to an immediately-next WDM node of said system by a single optical fiber and to an immediately-former WDM node of said system by another single optical fiber

Kai features work fibers 60a, 60b for attaching the optical transmission device 60 to the ring 52, and protection fibers 60c, 60d for the attachment. Consequently Kai nodes 60 in immediate adjacency are connected by two fibers, rather than a "single" fiber.

Sharma mentions it is possible to forfeit the benefits of the protection fiber (col. 2, line 58-62), by providing merely a single fiber with a sufficient number of wavelengths.

Kai frequencies $\lambda_1 - \lambda_4$ travel clockwise in the work fibers, and counterclockwise in the protection fibers. It would be physically impossible for these four frequencies to travel simultaneously in both directions on a single fiber.

Perhaps, the Office Action proposes modification of Kai into a system in which adjacent nodes are connected by a single fiber, to save money on fiber.

The protection function would therefore be forfeited, since failure of the single fiber leaves no protection fiber to pick up the signaling that would have been rerouted onto the protection fiber.

Elimination of the protection fiber, removes the need for the optical switches 101, 108. To create greater interchannel spacing in the demultiplexer 45, Giles would have suggested, if anything, a separate ADM unit 105 for each of the forward and reverse channels, i.e., two ADM units per device 60. This eliminates the need for the optical couplers 20, 21. Thus, as set forth above, the combination the Office Action proposes would not have been obvious.

Claims 15 and 16 likewise specify a single optical fiber, and the analysis applied above to claim 13 applies to claims 15 and 16.

Reconsideration and withdrawal of the rejection is respectfully requested.

Claims 13-16 stand rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 6,005,694 to Liu.

Claims 13-16 depend from base claims 1, 5 and 8, respectively. Liu relates to optical multiplexing, but not to interleaving. Liu fails to compensate for the shortcomings of the other references applied in rejection of claims 13-16.

In addition each of claims 13-16 further distinguish over the applied references.

For example, claim 13 recites:

The ADM of claim 1, wherein said ADM resides at a WDM node in a said WDM network system, said WDM node being connected in said WDM network system to an immediately-next WDM node of said system by a single optical fiber and to an immediately-former WDM node of said system by another single optical fiber

Kai features work fibers 60a, 60b for attaching the optical transmission device 60 to the ring 52, and protection fibers 60c, 60d for the attachment. Consequently Kai nodes 60 in immediate adjacency are connected by two fibers, rather than a "single" fiber.

The Office Action proposes a combination that would eliminate the protection fibers 60c, 60d in Kai. As set forth above, such a modification would not result in an embodiment that resembles any claim in the instant patent application.

For at least this reason, the combination of references the Office Action proposes does not render obvious the present invention as recited in claims 13-16.

Reconsideration and withdrawal of the rejection is respectfully requested.

In view of the foregoing amendments and remarks, it is believed that this application is now in condition for allowance. The Examiner is invited to contact the

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undersigned in the event of any perceived outstanding issues so that passage of the case to issue can be effected without the need for a further Office Action.

In the event that any additional fee is required to continue the prosecution of this Application as requested, please charge such fee to Deposit Account No. 502-470.

Respectfully submitted,

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